Service Manual

AK 37

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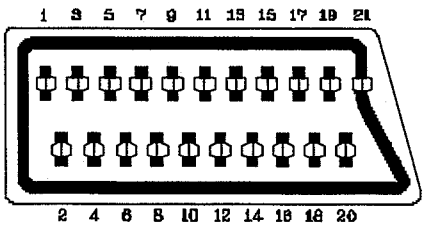
DO NOT CHANGE ANY MODULE UNLESS THE SET IS SWITCHED OFF
The mains supply part of the switch mode power supply's transformer is live.
Use an isolating transformer.
The receiver complies with the safety requirements.

SAFETY PRECAUTIONS:
The service of this TV set must be carried out by qualified persons only. Components marked with the warning symbol on the circuit diagram are critical for safety and must only be replaced with an identical component.
- Power resistor and fused resistors must be mounted in an identical manner to the original component.

TV set switched off:
Make short-circuit between HV-CRT clip and CRT ground layer.
Short C809 before changing IC800 and IC801 or other components in primary side of the SMPS part.

Measurements:
Voltage readings and oscilloscope traces are measured under the following conditions:
Antenna signal's level is 60dB at the color bar pattern from the TV pattern generator. (100% white, 75% color saturation)
Brightness, contrast, and color are adjusted for normal picture performance.
Mains supply, 220VAC, 50Hz.

PERI-TV SOCKET



SCART 1 PINING

1 Audio right output	0.5Vrms / 1K
2 Audio right input	0.5Vrms / 10K
3 Audio left output	0.5Vrms / 1K
4 Ground AF	
5 Ground Blue	
6 Audio left input	0.5Vrms / 10K
7 Blue input	0.7Vpp / 75ohm
8 AV switching input	0-12VDC /10K
9 Ground Green	
10 -	
11 Green input	0.7Vpp / 75ohm
12 -	
13 Ground Red	
14 Ground Blanking	
15 Red input	0.7Vpp / 75ohm
16 Blanking input	0-0.4VDC, 1-3VDC / 75 Ohm
17 Ground CVBS output	
18 Ground CVBS input	
19 CVBS output	1Vpp / 75ohm
20 CVBS input	1Vpp / 75ohm
21 Ground	

SCART 2 PINING

1 Audio right output	0.5Vrms / 1K
2 Audio right input	0.5Vrms / 10K
3 Audio left output	0.5Vrms / 1K
4 Ground AF	
5 Ground Blue	
6 Audio left input	0.5Vrms / 10K
7 Blue input	
8 AV switching input	0-12VDC /10K
9 Ground Green	
10 -	
11 -	
12 -	
13 Ground Red	
14 Ground Blanking	
15 -	
16 -	

17 Ground CVBS output		20 CVBS input	1Vpp / 75ohm
18 Ground CVBS input		21 Ground	
19 CVBS output	1Vpp / 75ohm		

1. INTRODUCTION

11AK37 is a 110° chassis capable of driving 25", 28", 29", 33" 4:3 and 28", 32" 16:9 tubes at the appropriate currents. The chassis is capable of operating in PAL, SECAM and NTSC standards and multiple transmission standards as B/G, D/K, I/I', and L/L'. standards. The sound system is capable of giving 12 watts RMS output into a load of 8 ohms. One page, 7 page SIMPLETEXT, TOPTEXT, FASTTEXT and US Closed Caption is also provided. The chassis is equipped with a double-deck 42 pin scart connector for AV input/output, front-AV input, one back-AV output, one SVHS, one headphone and one subwoofer.

2. SMALL SIGNAL PART WITH STV2248:

STV2248 video processor is essential for realizing all small signal functions for a color TV receiver.

2.1 Vision IF amplifier

The vision IF amplifier can demodulate signals with positive and negative modulation. The PLL demodulator is completely alignment-free. Although the VCO (Toko-coil) of the PLL circuit is external, yet the frequency is fixed to the required value by the original manufacturer thus the Toko-coil does not need to be adjusted manually. The setting of the various frequencies (38.9 or 45.75 MHz) can be made via changing the coil itself.

2.2 QSS Sound circuit (QSS versions)

The sound IF amplifier is similar to the vision IF amplifier and has an external AGC de-coupling capacitor. The single reference QSS mixer is realised by a multiplier. In this multiplier the SIF signal is converted to the inter-carrier frequency by mixing it with the regenerated picture carrier from the VCO. The mixer output signal is supplied to the output via a high-pass filter for attenuation of the residual video signals. With this system a high performance hi-fi stereo sound processing can be achieved. The AM sound demodulator is realised by a multiplier. The modulated sound IF signal is multiplied in phase with the limited SIF signal. The demodulator output signal is supplied to the output via a low-pass filter for attenuation of the carrier harmonics. The AM signal is supplied to the output via the volume control.

The AM demodulated signal results from multiplying the input signal by itself, it is available on AM/FM output.

2.3 FM demodulator and audio amplifier (mono versions):

The FM demodulator is realized as narrow-band PLL with external loop filter, which provides the necessary selectivity without using an external band-pass filter. To obtain a good selectivity a linear phase detector and constant input signal amplitude are required. For this reason the inter-carrier signal is internally supplied to the demodulator via a gain controlled amplifier and AGC circuit. The nominal frequency of the demodulator is tuned to the required frequency (4.5/5.5/6.0/6.5 MHz) by means of a calibration circuit that uses the clock frequency of the μ-controller/Teletext decoder as a reference. The setting to the wanted frequency is realized by means of the software. It can be read whether the PLL frequency is inside or outside the window and whether the PLL is in lock or not. With this information it is possible to make an automatic search system for the incoming sound frequency. This is realized by means of a software loop that alternate the demodulator to various frequencies, then select the frequency on which a lock condition has been found. De-emphasis output signal amplitude is independent of the TV

A second PLL is used for accurate fine-tuning of the SECAM bell filter. This tuning is achieved during the frame blanking. An external capacitor memorizes the bell filter tuning voltage.
A base-band chroma delay-line rebuilds the missing color line in SECAM and removes transmission phase errors in PAL.
The base-band chroma delay line is clocked with 6MHz signal provided by the horizontal scanning VCO.
The luminance processor is composed of a chroma trap filter, a luminance delay line, a peaking function with noise coring feature, a black stretch circuit.
Trap filter and luminance delay lines are achieved with the use of bi-quad integrated filters, auto-aligned via a master filter phase locked loop.

2.7 RGB output circuit:

The video processor performs the R, G, B processing.
There are three sources:

1. Y,U,V inputs (coming from luma part (Y output), and chroma decoder outputs (R-Y, B-Y outputs).
2. External R,G,B inputs from SCART (converted internally in Y,U,V), with also the possibility to input YUV signals from a DVD player, (YUV specification is Y=0.7 V PP , U= 0.7 V PP , V = 0.7V PP for 100% color bar).
3. Internal R,G,B inputs (for OSD and Teletext display)

The main functions of the video part are:

- Y,U,V inputs with integrated clamp loop, allowing a DC link with YUV outputs,
- External RGB inputs (RGB to YUV conversion), or direct YUV inputs,
- Y,U,V switches,
- Contrast, saturation, brightness controls,
- YUV to RGB matrix,
- OSD RGB input stages (with contrast control),
- RGB switches,
- APR function,
- DC adjustment of red and green channels,
- Drive adjustments (R, G, B gain),
- Digital automatic cut-off loop control,
- Manual cut-off capability with I^2C adjustments,
- Half tone, oversize blanking, external insertion detection, blue screen,
- Blanking control and RGB output stages.

2.8 µ-Controller

The ST92195 is the micro-controller, which is required for a color TV receiver. ST92195D1 is the version with one page Teletext and ST92195D7 is the one with 7 page Teletext. The IC has the supply voltages of 5 V and they are mounted in PSDIP package with 56 pins.
µ-Controller has the following features

- Display of the program number, channel number, TV Standard, analogue values, sleep timer, parental control and mute is done by OSD
- Single LED for standby and on mode indication
- System configuration with service mode
- 3 level logic output for SECAM and Tuner band switching

standard and has the same value for a frequency deviation of ±25 kHz at the 4.5 MHz standard and for a deviation of ±50 kHz for the other standards. When the IF circuit is switched to positive modulation the internal signal on de-emphasis pin is automatically muted. The audio control circuit contains an audio switch and volume control. In the mono inter-carrier sound versions the Automatic Volume Leveling (AVL) function can be activated. The pin to which the external capacitor has to be connected depends on the IC version.

2.4 Video switching

The video processor (STV2248C) has three CVBS inputs and two RGB inputs. The first CVBS input is used for external CVBS from SCART 1, the second is used for either CVBS or Y/C from either SCART2 or BAV/FAV or SVHS, and the third one is used for internal video. The selection between both external video inputs signals is realized by means of software and hardware switches.

2.5 Synchronization circuit

The video processor (STV224X) performs the horizontal and vertical processing. The external horizontal deflection circuit is controlled via the Horizontal output pulse (HOUT). The vertical scanning is performed through an external ramp generator and a vertical power amplifier IC controlled by the Vertical output pulse (VOUT).

The main components of the deflection circuit are:

- PLL1: the first phase locked loop that locks the internal line frequency reference on the CVBS input signal. It is composed of an integrated VCO (12 MHz) that requires the chroma reference frequency (4.43MHz or 3.58MHz crystal oscillator reference signal), a divider by 768, a line decoder, and a phase comparator.
- PLL2: The second phase locked loop that controls the phase of the horizontal output (Compensation of horizontal deflection transistor storage time variation). Also the horizontal position adjustment is also performed in PLL2.
- A vertical pulse extractor.
- A vertical countdown system to generate all vertical windows (vertical synchronization window, frame blanking pulses, 50/60Hz identification window...).
- Automatic identification of 50/60Hz scanning.
- PLL1 time constant control.
- Noise detector, video identification circuits, and horizontal coincidence detector.
- Vertical output stage including de-interlace function, vertical position control.
- Vertical amplitude control voltage output (combined with chroma reference output and Xtal 1 indication).

2.6 Chroma and luminance processing:

The chroma decoder is able to demodulate PAL, NTSC and SECAM signals.
The decoder dedicated to PAL and NTSC sub-carrier is based on a synchronous demodulator, and an Xtal PLL locked on the phase reference signal (burst).
The SECAM demodulation is based on a PLL with automatic calibration loop.
The color standard identification is based on the burst recognition.
Automatic and forced modes can be selected through the I^2C bus.
NTSC tint, and auto flesh are controlled through I^2C bus.
Xtal PLL can handle up to 3 crystals to work in PAL M, PAL N and NTSC M for South America.
ACC an ACC overload control the chroma sub-carrier amplitude within 26dB range. Both ACC s are based on digital systems and do not need external capacitor.
All chroma filters are fully integrated and tuned via a PLL locked on Xtal VCO signal.

3. TUNER

Either a PLL or a VST tuner is used as a tuner.
UV1316 (VHF/UHF) is used as a PLL tuner. For only PAL M/N, NTSC M applications UV 1336 is used as the PLL tuner. UV 1315 (VHF/UHF) is used as a VST Tuner.

Channel coverage of UV1316:

BAND	OFF-AIR CHANNELS		CABLE CHANNELS	
	CHANNELS	FREQUENCY RANGE (MHz)	CHANNELS	FREQUENCY RANGE (MHz)
Low Band	E2 to C	48.25 to 82.25 **(1)**	S01 to S08	69.25 to 154.25
Mid Band	E5 to E12	175.25 to 224.25	S09 to S38	161.25 to 439.25
High Band	E21 to E69	471.25 to 855.25 **(2)**	S39 to S41	447.25 to 463.25

(1). Enough margin is available to tune down to 45.25 MHz.
(2). Enough margin is available to tune up to 863.25 MHz.

Noise	Typical	Max.	**Gain**	Min.	Typical	Max.
Low band :	5dB	9dB	All channels	: 38dB	44dB	52dB
Mid band :	5dB	9dB	Gain Taper (of-air channels):			8dB
High band :	6dB	9dB				

Channel Coverage UV1336:

BAND	CHANNELS	FREQUENCY RANGE (MHz)
Low Band	2 to D	55.25 to 139.25
Mid Band	E to PP	145.25 to 391.25
High Band	QQ to 69	397.25 to 801.25

Noise is typically 6dB for all channels. **Gain** is minimum 38dB and maximum 50dB for all channels.

Channel Coverage of UV1315:

BAND	OFF-AIR CHANNELS		CABLE CHANNELS	
	CHANNELS	FREQUENCY RANGE (MHz)	CHANNELS	FREQUENCY RANGE (MHz)
Low Band	E2 to C	48.25 to 82.25 **(1)**	S01 to S10	69.25 to 168.25
Mid Band	E5 to E12	175.25 to 224.25	S11 to S39	231.25 to 447.25
High Band	E21 to E69	471.25 to 855.25 **(2)**	S40 to S41	455.25 to 463.25

(1). Enough margin is available to tune down to 45.25 MHz.
(2). Enough margin is available to tune up to 863.25 MHz.

Noise	Typ.	Max.	Gain	Min.	Typ.	Max.
Low band	6dB	9dB	All Channels	38dB	44dB	50dB
Mid band	6dB	10dB	Gain Taper			8dB
High band	6dB	11dB	(off-air channels)			

4. MULTISTANDARD SOUND PROCESSOR

The MSP 34xxG is designed to perform demodulation of FM or AM-Mono TV sound. Three kinds of MSP's are used: MSP 3400G,MSP 3410G and MSP 3411G. The MSP 3400G is fully pin and software-compatible to the MSP 3410G, but is not able to decode NICAM. It is also compatible to the MSP 3411G,sound processor IC with virtual dolby sound.

5. SOUND OUTPUT STAGETDA7269A

The TDA7269A is a class AB dual Audio power amplifier, specially designed for high quality sound applications as Hi-Fi music centers and TV sets. It is supplied by ±12VDC coming from two separate windings in the SMPS transformer.It gives 2x14W(THD=10%) output power into an 8ohm load.

6. VERTICAL OUTPUT STAGE WITH STV9306

The STV9306 is a fully I^2C controlled vertical deflection IC designed for use in 110°, 4/3 or 16/9 CRT applications. It integrates both the vertical deflection and E/W correction circuitries necessary in design of a 110° chassis.

7. VIDEO OUTPUT AMPLIFIER STV5112

The STV5112 consists of three monolithic video output amplifiers. The amplifier can be seen as an operational amplifier with negative feedback. The advantage of negative feedback is that the amplifier characteristics do not play an important role up to certain frequencies. The internal flash diodes protect the amplifiers against flash over in the picture tube. The only protections required at the cathode outputs are a flash resistor and a spark gap.
Furthermore, the device has a high voltage power supply (VDD) and a low voltage one (VCC).

8. POWER SUPPLY (SMPS)

The DC voltages required at various parts of the chassis are provided by an SMPS transformer controlled by the IC MC44608 which is designed for driving, controlling and protecting switching transistor of SMPS. The transformer produces 150V for FBT input, ±12V for audio output IC, +5V and +8V for ST92195.

9. POWER FACTOR CORRECTION

Passive components are used for the solution of power factor correction.

10. SERIAL ACCESS CMOS 8K EEPROM 24C08

The 24C08 is a 8Kbit electrically erasable programmable memory (EEPROM), organized as 4 blocks of 256*08 bits. The memory is compatible with the I^2C standard, two wire serial interface which uses a bi-directional data bus and serial clock.

11. CLASS AB STEREO HEADPHONE DRIVER TDA1308

The TDA1308 is an integrated class AB stereo headphone driver contained in a DIP8 plastic package.

12. CLASS AB MONO SUBWOOFER DRIVER TDA7261

The TDA7261 is a class AB dual Audio power amplifier, specially designed for high quality sound applications in mono TV chassis. It is supplied by ±12VDC.

13. SAW FILTERS

Saw filter type:	**Model:**
G1975M:	PAL B/G MONO
K2966M:	PAL SECAM B/G/D/K/I MONO
J1981 :	PAL-I MONO
K2958M:	PAL-SECAM B/G-D/K (38) MONO
K2962M:	PAL-SECAM B/G/D/K/I/L/L' MONO
L9653M:	SECAM L/L' AM MONO (AUDIO IF)
G3967M:	PAL-SECAM B/G STEREO (VIDEO IF)
G9353M:	PAL-SECAM B/G STEREO (AUDIO IF)
K3958M:	PAL-SECAM B/G/D/K/I/L/L' STEREO (VIDEO IF)
K9356M:	PAL-SECAM B/G/D/K/I STEREO (AUDIO IF)
K9656M:	PAL-SECAM B/G/D/K/I/L/L' STEREO (AUDIO IF)
K3958M:	PAL I NICAM (VIDEO IF)
K9356M:	PAL I NICAM (AUDIO IF)
M1962M:	PAL M/N NTSC M MONO
M3953M:	PAL M/N NTSC M STEREO (VIDEO IF)
M9370M:	PAL M/N NTSC M STEREO (AUDIO IF)

IC DESCRIPTIONS AND INTERNAL BLOCK DIAGRAM

- ST92195
- STV224X
- TUNER (UV1315, UV1316, UV1336)
- TDA7269A
- STV9306
- STV5112
- MC44608
- MSP 34XXG
- 24C08
- TDA1308
- SAW FILTERS

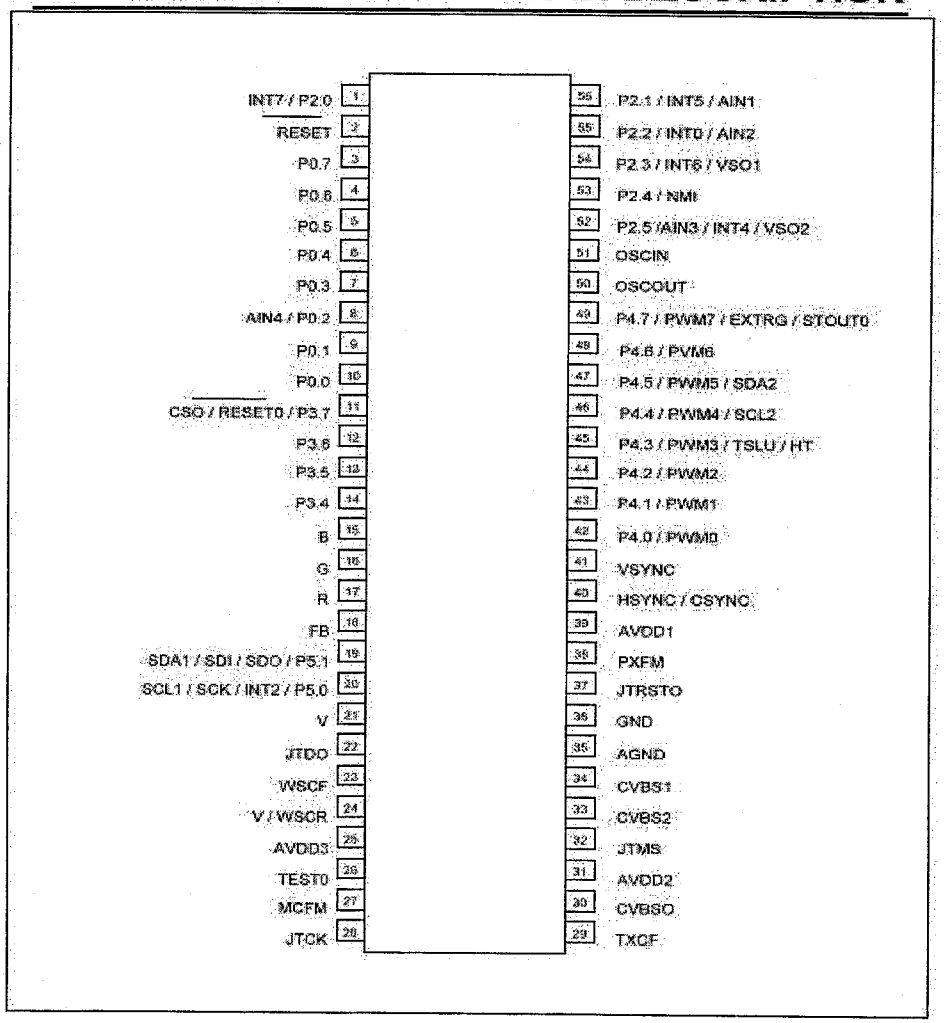
G1975M, K2966M, K2962M, L9653M, G3962M, G9353M, K3958M, K9356M, K9656M, K6263K, K9652M,M1962M, M3953M, M9370M

ST92195

The ST92195 is a member of the ST9+ family of micro-controllers, completely developed and produced by SGS-THOMSON Microelectronics using a proprietary n-well HCMOS process. The nucleus of the ST92195 is the advanced Core, which includes the Central Processing Unit (CPU), the ALU, the Register File and the interrupt controller. The Core has independent memory and register buses to add to the efficiency of the code. A set of on-chip peripherals form a complete sys-tem for TV set and VCR applications:

– Voltage Synthesis
– VPS/WSS Slicer
– Teletext Slicer
– Teletext Display RAM
– OSD
Additional peripherals include a watchdog timer , a serial peripheral interface (SPI), a 16-bit timer and an A/D converter.

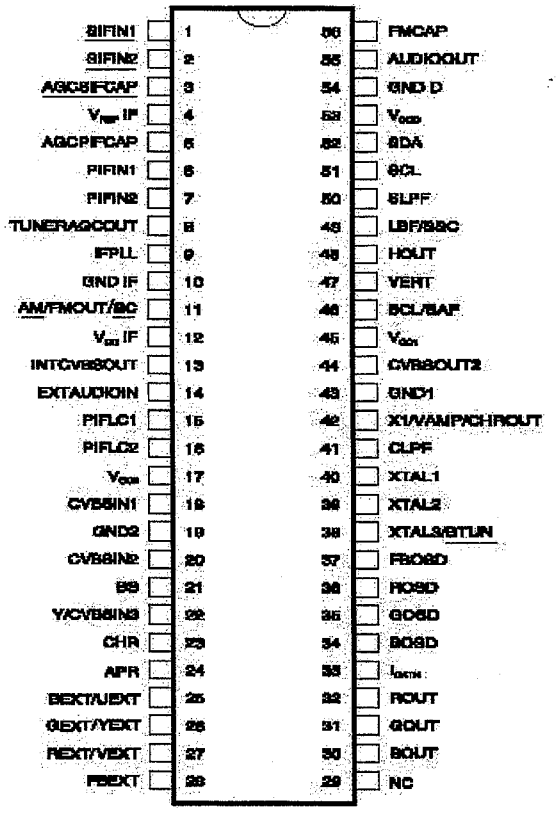
MICROCONTROLLER PIN DESCRIPTION



STV224X Video processor:

The STV2246/2247/2248 are fully bus controlled ICs for TV including PIF, SIF, luma, chroma and deflection processing. Used with a vertical frame booster (TDA1771 or TDA8174 for 90° chassis, STV9306 for 110° chassis), they allow the design of multi-standard (BGDKIMNLL, PAL/ SECAM/NTSC) sets with very few external components and no manual adjustments.

PIN CONNECTIONS S1V2Z4X/8X (SDIP56)



UV1315, UV1316, UV1336

General description of UV1315:

The UV1315 tuner belongs to the UV 1300 family of tuners, which are designed to meet a wide range of applications. It is a combined VHF, UHF tuner suitable for CCIR systems B/G, H, L, L', I and I'.

Features of UV1315:

- Member of the UV1300 family small sized UHF/VHF tuners
- Systems CCIR:B/G, H, L, L', I and I'; OIRT:D/K
- Voltage synthesized tuning (VST)
- Off-air channels, S-cable channels and Hyper-band
- Standardized mechanical dimensions and pinning

PINNING	PIN VALUE
1. Gain control voltage (AGC)	:4.0V, Max:4.5V
2. Tuning voltage	
3. High band switch	:5V, Min:4.75V, Max:5.5V
4. Mid band switch	:5V, Min:4.75V, Max:5.5V
5. Low band switch	:5V, Min:4.75V, Max:5.5V
6. Supply voltage	:5V, Min:4.75V, Max:5.5V
7. Not connected	
8. Not connected	
9. Not connected	
10. Symmetrical IF output 1	
11. Symmetrical IF output 2	

Band switching table:

	Pin 3	Pin 4	Pin 5
Low band	0V	0V	+5V
Mid band	0V	+5V	0V
High band	+5V	0V	0V

General description of UV1316:

The UV1316 tuner belongs to the UV 1300 family of tuners, which are designed to meet a wide range of applications. It is a combined VHF, UHF tuner suitable for CCIR systems B/G, H, L, L', I and I'.

Features of UV1316:

- Member of the UV1300 family small sized UHF/VHF tuners
- Systems CCIR: B/G, H, L, L', I and I'; OIRT: D/K
- Digitally controlled (PLL) tuning via I²C-bus
- Off-air channels, S-cable channels and Hyper-band
- World standardized mechanical dimensions and world standard pinning
- Complies to "CENELEC EN55020" and "EN55013"

PINNING	PIN VALUE
1. Gain control voltage (AGC)	:4.0V, Max:4.5V
2. Tuning voltage	
3. I²C-bus address select	:Max:5.5V
4. I²C-bus serial clock	:Min:-0.3V, Max:5.5V
5. I²C-bus serial data	:Min:-0.3V, Max:5.5V
6. Not connected	
7. PLL supply voltage	:5.0V, Min:4.75V, Max:5.5V
8. ADC input	
9. Tuner supply voltage	:33V, Min:30V, Max:35V
10. Symmetrical IF output 1	
11. Symmetrical IF output 2	

General description of UV1336:

UV1336 series is developed for reception of channels broadcast in accordance with the M, N standard.

Features of UV1336:

- Global standard pinning
- Integrated Mixer-Oscillator & PLL function
- Conforms to CISPR 13, FCC and DOC (Canada) regulations
- Low power consumption
- Both phono connector and 'F' connector are available

PINNING	PIN VALUE
1. Gain control voltage	:4.0V, Max:4.5V
2. Tuning voltage	
3. Address select	Max:5.5V
4. Serial clock	:Min:-0.3V, Max:5.5V
5. Serial data	:Min:-0.3V, Max:5.5V
6. Not connected	
7. Supply voltage	:5.0V, Min:4.75V, Max:5.5V
8. ADC input (optional)	
9. Tuning supply voltage	:33V, Min:30V, Max:35V
10. Ground	
11. IF output	

TDA7269A

General Description of TDA7269A

The TDA7269A is a class AB dual Audio power amplifier, specially designed for high quality sound applications as Hi-Fi music centers and TV sets. Requires very few external components.

- Wide supply voltage range up to ±20V
- Split supply
- High output power; 14 + 14W @THD =10%, R_L =8W,V_S= ±16V
- No pop at turn-on/off
- Mute (Pop free)
- Stand-by feature
- Thermal overload protection
- Short circuit protection to gnd

PINNING

1	- V_S
2	Output1
3	+ V_S
4	Output2
5	Mute
6	- V_S
7	In+(2)
8	In-(2)
9	Gnd
10	In-(1)
11	In+(1)

STV9306

General description:

The STV9306 is a fully I^2C controlled vertical deflection IC designed for use in 110°, 4/3 or 16/9 CRT applications. It integrates both the vertical deflection and E/W correction circuitries necessary in design of a 110° chassis.

FEATURES

- FULLY I^2C CONTROLLED
- DMOS POWER HALF-BRIDGE AMPLIFIER
- DC COUPLED OPERATION
- INTERNAL FLYBACK GENERATOR (UP TO 60V)
- SELF ADAPTED SAWTOOTH (50/60Hz)
- 100Hz OPERATION
- VERTICAL LINEARITY, AMPLITUDE AND CENTERING ADJUSTMENTS
- HORIZONTAL WIDTH, PINCUSHION, TRAPEZOID AND CORNER ADJUSTMENTS
- BREATHING CORRECTION
- 4/3, 16/9 CRT APPLICATION
- THERMAL PROTECTION
- LINEAR VERTICAL ZOOM FUNCTION
- E/W CLASS A OUTPUT
- LOW EXTERNAL COMPONENTS

PINNING

1.	SCL
2.	CRAMP
3.	SDA
4.	CHOLD
5.	SYNC
6.	Vs
7.	FLYBACK
8.	GND
9.	OUT
10.	VOPS
11.	EWOUT
12.	SENS2
13.	EWFB
14.	SENS1
15.	BREATHING

STV5112

General Description:

The STV5112 includes three video amplifiers designed with a high voltage bipolar/CMOS/DMOS technology (BCD). It drives directly the three cathodes and is protected against flashovers. Thanks to its three cathode current outputs, the STV5112 can be used with both parallel and sequential sampling applications.

Bandwidth: 8MHz TYPICAL
Supply Voltage: 220V typical
Rise and fall time: 50ns typical
CRT cathode current outputs for parallel or sequential cut-off or drive adjustment
Flashover protection
Power dissipation: 3.6W

PINNING	PIN VALUE
1.	BLUE INPUT
2.	VCC LOW VOLTAGE
3.	GREEN INPUT
4.	RED INPUT
5.	VDD HIGH VOLTAGE
6.	RED CATHODE CURRENT
7.	RED OUTPUT
8.	GROUND
9.	RED FEEDBACK
10.	GREEN OUTPUT
11.	GREEN CATHODE CURRENT
12.	GREEN FEEDBACK
13.	BLUE OUTPUT
14.	BLUE CATHODE
15.	BLUE FEEDBACK

MC44608

General description:

The MC44608 is a high performance voltage-mode controller designed for off–line converters. This high voltage circuit that integrates the start–up current source and the oscillator capacitor, requires few external

components while offering a high flexibility and reliability.The device also features a very high efficiency stand–by management consisting of an effective Pulsed Mode operation. This technique enables the reduction of the stand–by power consumption to approximately 1W while delivering 300mW in a 150W SMPS.

- Integrated start–up current source
- Loss less off–line start–up
- Direct off–line operation
- Fast start–up

General Features

- Flexibility
- Duty cycle control
- On chip oscillator switching frequency 40, or 75kHz
- Secondary control with few external components

Protections

- Maximum duty cycle limitation
- Cycle by cycle current limitation
- Demagnetization (Zero current detection) protection
- "Over VCC protection" against open loop
- Programmable low inertia over voltage protection against open loop
- Internal thermal protection

GreenLine Controller

- Pulsed mode techniques for a very high efficiency low power mode
- Lossless startup
- Low dV/dT for low EMI radiations

PINNING	PIN VALUE
1. Demagnetization	Zero cross detection voltage: 50-mV typ.
2. I Sense	Over current protection voltage 1V typ.
3. Control Input	Min: 7.5V Max.: 18V
4. Ground	Iout $2A_{p-p}$ during scan $1.2A_{p-p}$ during flyback
5. Driver	Output resistor 8.5 Ohm sink 15 Ohm source typ.
6. Supply voltage	Max:16V (Operating range 6.6V-13V)
7. No connection	
8. Line Voltage	Min:50V Max:500V

MSP 34XXG

General description:

The MSP 34xxG family of single-chip Multi-standard Sound Processors covers the sound processing of all analog TV standards worldwide, as well as the NICAM digital sound standards. The full TV sound processing, starting with analog sound IF signal-in, down to processed analog AF-out, is performed on a single chip.

Two-carrier FM systems according to the German or Korean terrestrial specs or the satellite specs can be processed with the MSP 34x0G. Digital demodulation and decoding of NICAM-coded TV stereo sound, is done only by the MSP 3410G. The MSP 34x0G offers a powerful feature to calculate the carrier field strength, which can be used for automatic standard detection (terrestrial) and search algorithms (satellite).

The MSP 3411G has all functions of the MSP34x0G with the addition of a virtual surround sound feature. Surround sound can be reproduced to a certain extent with two loudspeakers. The MSP3411G includes our virtualizer algorithm "3D-PANORAMA" which has been approved by the Dolby Laboratories for compliance with the "Virtual Dolby Surround" technology. In addition, the MSP 34x1G includes our "PANORAMA" algorithm. The MSP34x1G has built-in automatic functions: The IC is able to detect the actual sound standard automatically (Automatic Standard Detection). Furthermore, pilot levels and identification signals can be evaluated internally with subsequent switching between mono/ stereo/bilingual; no I^2C interaction is necessary (Automatic Sound Selection).

General Features

- Two selectable analog inputs (TV and SAT-IF sources)
- Automatic Gain Control (AGC) for analog IF input. Input range: 0.10–3 V pp
- Integrated A/D converter for sound-IF inputs
- All demodulation and filtering is performed on chip and is individually programmable
- Easy realization of all digital NICAM standards (B/G, D/K, I & L) with MSP 3410G.
- FM demodulation of all terrestrial standards (incl. identification decoding)
- FM demodulation of all satellite standards
- No external filter hardware is required
- Only one crystal clock (18.432 MHz) is necessary
- FM carrier level calculation for automatic search algorithms and carrier mute function
- Subwoofer output with on-chip programmable low-pass and complementary high-pass filters

DSP Section (Audio Base band Processing)

- Flexible selection of audio sources to be processed
- Two digital input and one output interface via I 2 S bus for external DSP processors, featuring surround sound, ADR etc.
- Digital interface to process ADR (ASTRA Digital Radio) together with DRP 3510A
- Performance of all de-emphasis systems including adaptive Wegener Panda 1 without external components or controlling
- Digitally performed FM identification decoding and de-matrixing
- Digital base-band processing: volume, bass, treble, 5-band equalizer, loudness, pseudo-stereo, and base-width enlargement
- Simple controlling of volume, bass, treble, equalizer etc.

Analog Section

- four selectable analog pairs of audio base-band inputs (= four SCART inputs) input level: =<2 V RMS , input impedance: >=25 kΩ
- one analog mono input (i.e. AM sound): input level: =<2 V RMS , input impedance: >=15 kΩ
- two high-quality A/D converters, S/N-Ratio: >=85 dB
- 20 Hz to 20 kHz bandwidth for SCART-to-SCART copy facilities

24CO8

General description:

The 24C16 is a 8Kbit electrically erasable programmable memory (EEPROM), organized as 4 blocks of 256 * 08 bits. The memory operates with a power supply value as low as 2.5V.

Features:

- Minimum 1 million ERASE/WRITE cycles with over 10 years data retention

- Single supply voltage:4.5 to 5.5V
- Two wire serial interface, fully I²C-bus compatible
- Byte and Multi-byte write (up to 8 bytes)
- Page write (up to 16 bytes)
- Byte, random and sequential read modes
- Self timed programming cycle

PINNING	PIN VALUE	
1. Write protect enable	:0V	
2. Not connected	:0V	
3. Chip enable input	:0V	
4. Ground	:0V	
5. Serial data address input/output	:Input LOW voltage:	Min:-0.3V, Max:0.3*Vcc
	:Input HIGH voltage:	Min:0.7*Vcc, Max:Vcc+1
6. Serial clock	:Input LOW voltage:	Min:-0.3V, Max:0.3*Vcc
	:Input HIGH voltage:	Min:0.7*Vcc, Max:Vcc+1
7. Multibyte/Page write mode	:Input LOW voltage:	Min:-0.3V, Max:0.5V
	:Input HIGH voltage:	Min:Vcc-0.5, Max:Vcc+1
8. Supply voltage	:Min:2.5V, Max:5.5V	

TDA1308

Features:

- Wide temperature range
- Excellent power supply ripple rejection
- Low power consumption
- Short-circuit resistant
- High performance
- high signal-to-noise ratio
- low distortion

PINNING	PIN VALUE
1. Output A (Voltage swing)	:Min:0.75V, Max:4.25V
2. Inverting input A	:Vo(clip):Min:1400mVrms
3. Non-inverting input A	:2.5V
4. Ground	:0V
5. Non-inverting input B	:2.5V
6. Inverting input B	:Vo(clip):Min:1400mVrms
7. Output B (Voltage swing)	:Min:0.75V, Max:4.25V
8. Positive supply	:5V, Min:3.0V, Max:7.0V

TDA7261

General Description of TDA7261

The TDA7261 is a class AB dual Audio power amplifier, specially designed for high quality sound applications in mono TV sets.

- Wide supply voltage range up to 50V ABS max.
- Split supply
- High output power;25W @THD =10%, R_L =8W,V_S= ±20V

- No pop at turn-on/off
- Mute (Pop free)
- Stand-by feature
- Thermal overload protection
- Short circuit protection to gnd

PINNING

1. N.C.
2. $+V_S$
3. Output
4. Mute/Stby
5. $-V_S$
6. In
7. GND
8. N.C.

Saw filter's list:

		VIDEO	AUDIO
MONO	PAL BG	G1975M	
	PSBG DK	K2966M	
	PAL II'	J1981	
	PSBGDKK' II'	K2966M	
	PSBGDKK' LL'	K2962M	L9653

		VIDEO	AUDIO
STR	PAL BG	G3967M	G9353M
	PAL II'	K3958M	K9356
	PSBGDKK' II'	K3958M	K9356
	PSBGDKK' LL'	K3958M	K9656

PINNING

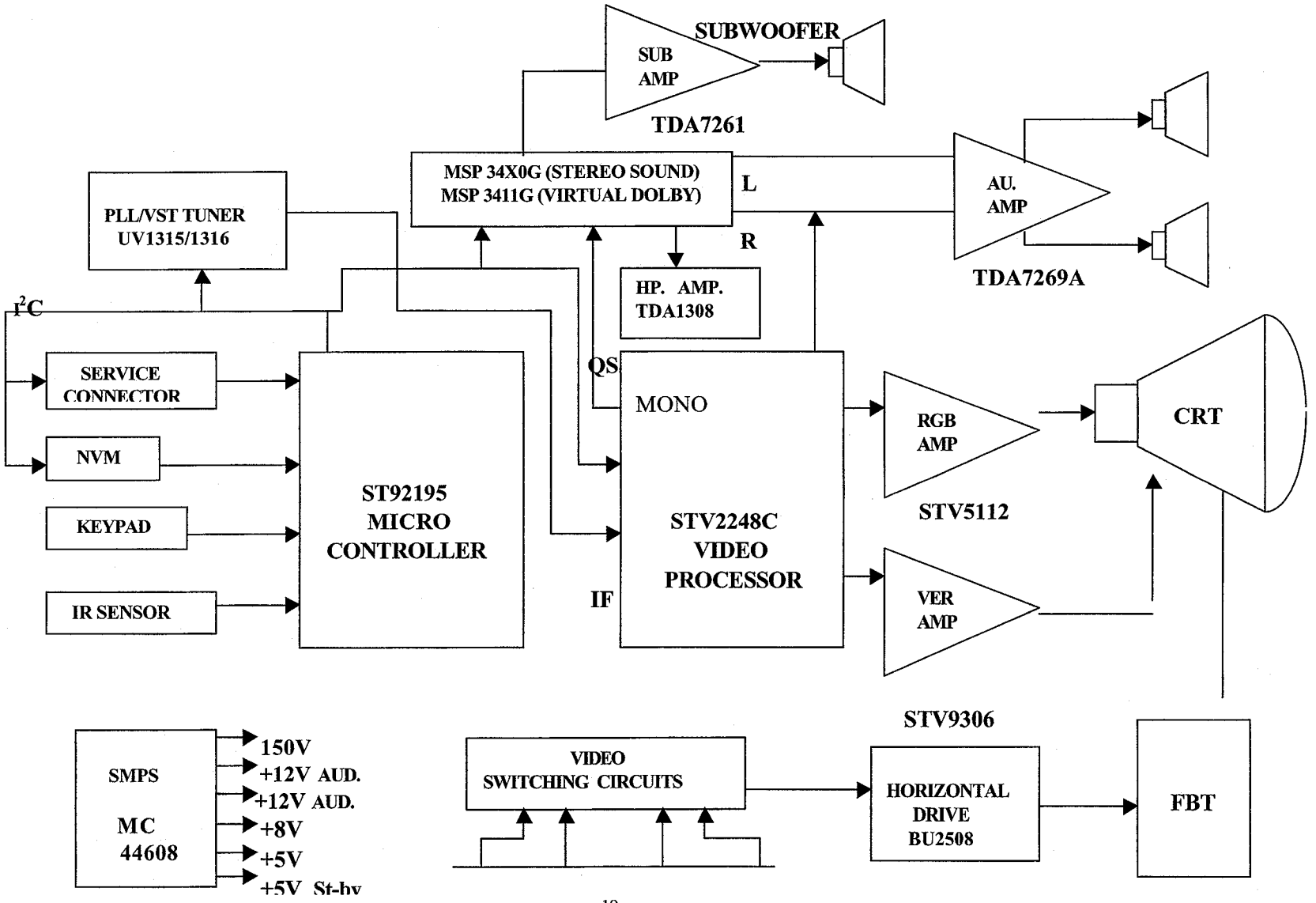
1. Input
2. Input-ground
3. Chip carrier-ground
4. Output
5. Output

K9656M, L9653M

PINNING

1. Input
2. Switching Input
3. Chip carrier-ground
4. Output
5. Output

GENERAL BLOCK DIAGRAM of 11AK37



SCART2 SCART1 FAV/BAV SVHS

AK37/TITANIUM SERVICE MENU

SERVICE ADJUSTMENTS

	Parameter	Notes
OSD	OSD Horizontal Position	
IF1	IF Coarse Adjust	
IF2	IF Fine Adjust	
IF3	IF Coarse Adjust for L-Prime	
IF4	IF Fine Adjust for L-Prime	
AGC	Automatic Gain Control	
VLIN	Vertical Linearity	
VS1A	Vertical Size for 50 Hz / 4:3 (AK30)	
VS1B	Vertical Size for 50 Hz / 16:9 (AK30)	
VP1	Vertical Position for 50 Hz (AK30)	
HP1	Horizontal Position for 50 Hz (AK30)	
VS2A	Vertical Size for 60 Hz / 4:3 (AK30)	
VS2B	Vertical Size for 60 Hz / 16:9 (AK30)	
VP2	Vertical Position for 60 Hz (AK30)	
HP2	Horizontal Position for 60 Hz (AK30)	
RGBH	RGB Horizontal Shift Offset	CVBS – RGB Horizontal position compensation
VSOF	Vertical Size Offset for 60 Hz (AK37)	
VPOF	Vertical Position Offset for 60 Hz (AK37)	
HSOF	Horizontal Size Offset for 60 Hz (AK37)	
HPOF	Horizontal Position Offset for 60 Hz (AK37)	
HTOF	Horizontal Trap Correction Offset for 60 Hz (AK37)	
WR	White Point Adjust for RED	
WG	White Point Adjust for GREEN	
WB	White Point Adjust for BLUE	
BR	Bias for RED	
BG	Bias for GREEN	
APR	APR Threshold	
FMP1	FM Prescaler when AVL is OFF	STEREO ONLY
NIP1	NICAM Prescaler when AVL is OFF	STEREO ONLY
SCP1	SCART Prescaler when AVL is OFF	STEREO ONLY
FMP2	FM Prescaler when AVL is ON	STEREO ONLY
NIP2	NICAM Prescaler when AVL is ON	STEREO ONLY
SCP2	SCART Prescaler when AVL is ON	STEREO ONLY

S1V	SCART1 Volume	STEREO ONLY
S2V	SCART2 Volume	STEREO ONLY
F1H	High Byte of crossover frequency for VHF1-VHF3	Meaningful for only PLL Tuner
F1L	Low Byte of crossover frequency for VHF1-VHF3	Meaningful for only PLL Tuner
F2H	High Byte of crossover frequency for VHF3-UHF	Meaningful for only PLL Tuner
F2L	Low Byte of crossover frequency for VHF3-UHF	Meaningful for only PLL Tuner
BS1	Band Switch Byte for VHF1	Meaningful for only PLL Tuner
BS2	Band Switch Byte for VHF3	Meaningful for only PLL Tuner
BS3	Band Switch Byte for UHF	Meaningful for only PLL Tuner
CB	Control Byte	Meaningful for only PLL Tuner
OP1	Option 1 (see the Option List)	
OP2	Option 2 (see the Option List)	
OP3	Option 3 (see the Option List)	
OP4	Option 4 (see the Option List)	
OP5	Option 5 (see the Option List)	
TX1	Teletext Option 1 (see the Option List)	
GEOM	Geometry Option (see the Option List) (AK37)	

OPTION LIST

OP1 – Peripheral Options

7	6	5	4	3	2	1	0	
								NOT USED
	6							1, Display "AV-3" as "F-AV" 0, Display "AV-3" as "B-AV"
		5						1, Turn back TV mode after the last AV (with AV key) 0, Turn back first AV mode after the last AV
			4					1, SVHS is available in AV key stream 0, SVHS is NOT available in AV key stream
				3				1, RGB is available in AV key stream 0, RGB is NOT available in AV key stream
					2			1, AV-3 is available in AV key stream 0, AV-3 is NOT available in AV key stream
						1		1, AV-2 is available in AV key stream 0, AV-2 is NOT available in AV key stream
							0	1, AV-1 is available in AV key stream 0, AV-1 is NOT available in AV key stream

OP2 – Reception Standard Options

7	6	5	4	3	2	1	0	
7								1, 3-button keyboard (V-, P+, V+) 0, 4/5 button keyboard (V-, V+, P-, P+, Menu)
	6							1, L/L' is available 0, L/L' is not available
		5						1, I is available 0, I is not available
			4					1, DK is available 0, DK is not available
				3				1, BG is available 0, BG is not available
					2			1, 3D PANORAMA is visible 0, DOLBY VIRTUAL is visible
						1		1, for SECAM LLP, EXT MONO INPUT is available 0, inner demodulation is available for SECAM LLP
							0	1, LOW POWER is available 0, LOW POWER is not available

OP3 – Video Options

7	6	5	4	3	2	1	0	
								Xtal Configuration 00, 1 Xtal PAL 4.43 01, 2 Xtal PAL/NTSC 4.43/3.58 10, 1 Xtal PAL/SEC/NTSC 4.43 11, 2 Xtal PAL/SEC/NTSC 4.43/3.58
								1, Enable Blue back when no signal in AV modes 0, No blue back in AV modes
								1, White Insertion is ON 0, White Insertion is OFF
								1, Blue Background when no signal 0, Disable Blue Background
								1, Semi-transparent background for menu 0, Solid Menu background for menu
								1, Black Stretch is ON 0, Black Stretch is OFF
								1, APR is ON 0, APR is OFF

OP4 – TV Features

7	1, Headphone is available (for STEREO models) 0, Headphone is not available
6	1, Arabic/Persian is Available in Menu Languages (for A, D, E, F, and later) 0, Arabic/Persian is NOT Available in Menu Languages
5	1, Hebrew is Available in Menu Languages (for A, D, E, F, and later) 0, Hebrew is NOT Available in Menu Languages
4	1, Hotel Mode can be activated 0, Hotel Mode can not be activated
3	1, No Signal Timer is enabled 0, No Signal Timer is disabled
2	For PLL Tuner 1, Frequency based search 0, Channel table based search *(No meaning for for VST Tuner)*
1	1, 3-band tuning (VHF1, VHF3, UHF) 0, 1-band tuning (only UHF)
0	1, Extra 200 msec blanking for VST 0, no-extra blanking

OP5 – Channel Tables

7	1, Extra 150 msec blanking more for VST (if OP4.b0 = 1, to SECAM color problem) 0, no-extra blanking
6	1, "Programme" item in AUTOSTORE menu is visible 0, "Programme" item in AUTOSTORE menu is invisible
5	1, Force both channel on even no carrier (carrier mute disable) 0, Default value after reset
4	1, French OS Channel Table is available 0, French OS Channel Table is not available
3	1, French Channel Table is available 0, French Channel Table is not available
2	1, England Channel Table is available 0, England Channel Table is not available
1	1, East Europe Channel Table is available 0, East Europe Channel Table is not available
0	1, West Europe Channel Table is available 0, West Europe Channel Table is not available

TX1 – Teletext Options

7	6	5	4	3	2	1	0	
								1, Auto APS after Stand-By 0, no APS after Stand-By
								RESERVED (must be 0)
								Teletext Language Groups 000, Group 1 – West (English, French, Swedish, Czech, German, Portuguese, Italien, Rumanian) 001, Group 2 – West/East (Polish, French, Swedish, Czech, German, Serbian, Italien, Rumanian) 010, Group 3 – West/Turkish (English, French, Swedish, Turkish, German, Portuguese, Italien, Rumanian) 011, Group 4 – East/Cyrillic (English, Cyrillic, Swedish, Czech, German, Serbian, Lettish, Rumanian) 100, Group 5 – Arabic (English, French, Swedish, Turkish, German, Hebrew, Italien, Arabic)
								Device type selection 000, EPROM M6 A 001, ROM H5 P 010, ROMLESS H5 P 011, EPROM M6 R 100, ROM M6 R 101, OSDEPROM M6 R 110, ROM M6 P 111, Read Auto Gain Table for the device from EEPROM

GEOM – Geometry Options (for AK37)

7								NOT USED
	6							1, SVHS audio input in FAV/BAV in 0, SVHS in AV2
		5						1, AK37 adjustment values are valid (default for AK37) 0, AK30 adjustment value are valid
			4					1, ZOOM mode is available 0, ZOOM mode is not available
				3				1, SUBTITLE mode is available 0, SUBTITLE mode is not available
					2			1, CINEMA mode is available 0, CINEMA mode is not available
						1		1, 14:9 mode is available 0, 14:9 mode is not available
							0	1, Tube Format16:9 0, Tube Format 4:3

TUNER SETTINGS

	VHF1-VHF3 Frq. (Mhz)	VHF3-UHF Frq. (Mhz)	AK30 SERVICE MENU ITEMS							
			F1H	F1L	F2H	F2L	BS1	BS2	BS3	CB
Philips UV1316S MK3	156,25 MHz	441,25 MHz	00001100	00110010	00011110	00000010	00000001	00000010	00000100	10001110
Thomson CTT5020	114,25 MHz	401,25 MHz	00001001	10010010	00011011	10000010	00000011	00000110	10000101	10001110
Samsung TECC2949PG28B	170,25 MHz	465,25 MHz	00001101	00010010	00011111	10000010	00000001	00000010	00000100	10001110
Samsung TECC2949PG35B	170,25 MHz	449,25 MHz	00001101	00010010	00011110	10000010	00000001	00000010	00001000	10001110
Alps TEDE9X226A	142,25 MHz	425,25 MHz	00001011	01010010	00011101	00000010	00000001	00000010	00001000	10001110
Alps TEDE9-004A	149,25 MHz	424,25 MHz	00001011	11000010	00011100	11110010	00000001	00000010	00001000	10001110

Explanations	
F1H	High byte of VHF1-VHF3 cross-over frequency
F1L	Low byte of VHF1-VHF3 cross-over frequency
F2H	High byte of VHF3-UHF cross-over frequency
F2L	Low byte of VHF3-UHF cross-over frequency
BS1	Band switching byte for VHF1
BS2	Band switching byte for VHF3
BS3	Band switching byte for UHF
CB	Control byte

AK37/TITANIUM – Languages Groups

GROUP 1 - WEST

- ENGLISH
- FRENCH
- SWEDISH
- CZECH
- GERMAN
- PORTUGUESE
- ITALIAN
- RUMANIAN

GROUP 2 – WEST / EAST

- POLISH
- FRENCH
- SWEDISH
- CZECH
- GERMAN
- SERBIAN
- ITALIAN
- RUMANIAN

GROUP 3 – WEST / TURKEY

- ENGLISH
- FRENCH
- SWEDISH
- TURKISH
- GERMAN
- PORTUGUESE
- ITALIAN
- RUMANIAN

GROUP 4 – EAST / CYRILLIC

- ENGLISH
- CYRILLIC
- SWEDISH
- CZECH
- GERMAN
- SERBIAN
- LETTISH
- RUMANIAN

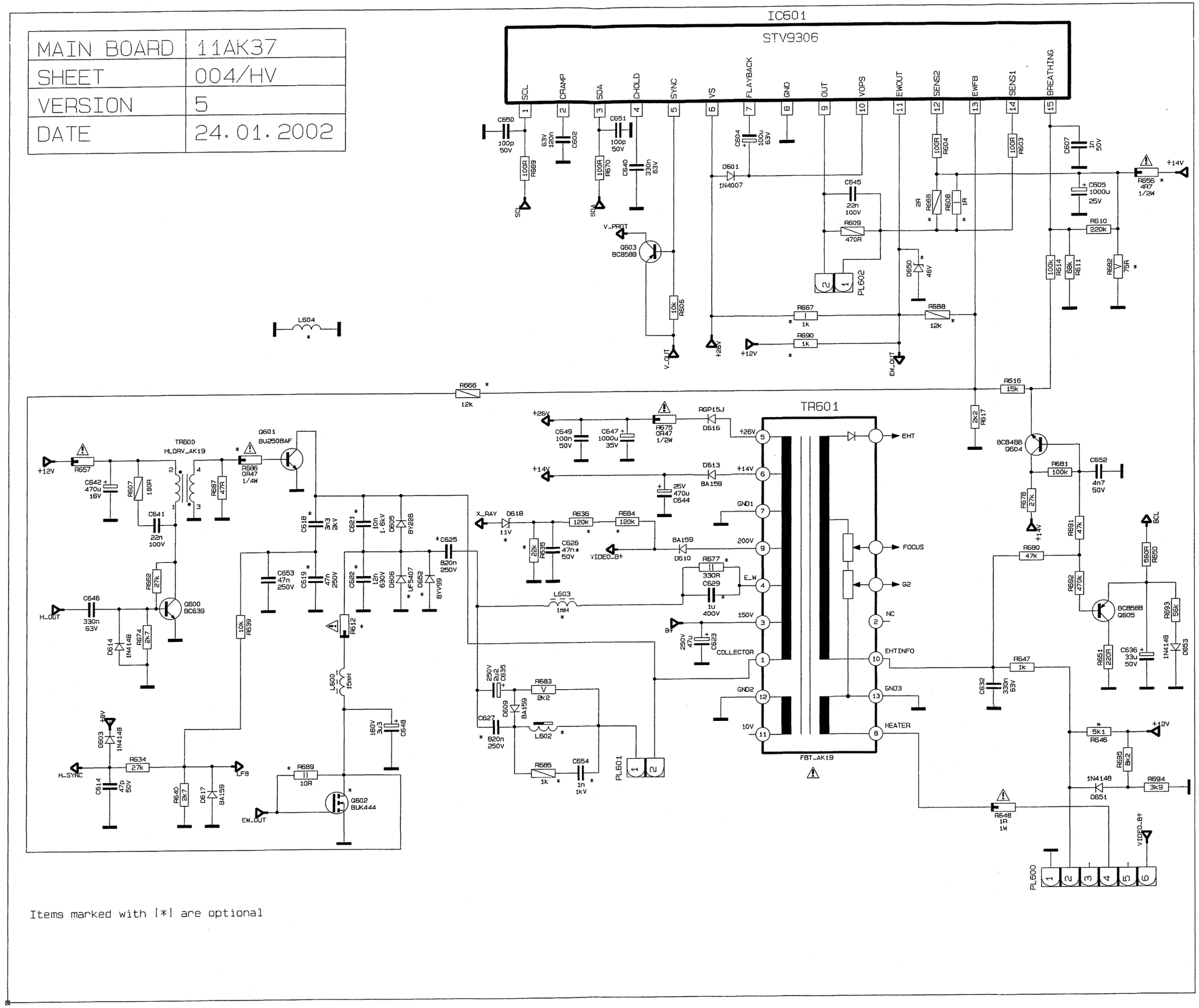
GROUP 5 - ARABIC

- ENGLISH
- FRENCH
- SWEDISH
- TURKISH
- GERMAN
- HEBREW
- ITALIAN
- ARABIC

Using Remote Control Buttons

RED : Is used to switch AVL to ON or OFF mode on service menu.
GREEN : Is used to enter the geometry menu.
YELLOW : Is used to prepare the system for screen adjustments.
BLUE : Is used for automatic IF and AGC adjustments.
TTX Update : Is used to change the picture mode.

MAIN BOARD	11AK37
SHEET	004/HV
VERSION	5
DATE	24.01.2002



Items marked with [*] are optional

MAIN BOARD	11AK37
SHEET	002/Video
VERSION	5
DATE	23.01.2002

IC403

STV223X_SHRINK56

IC301

TDA7269A

PL405

PL301

PL302

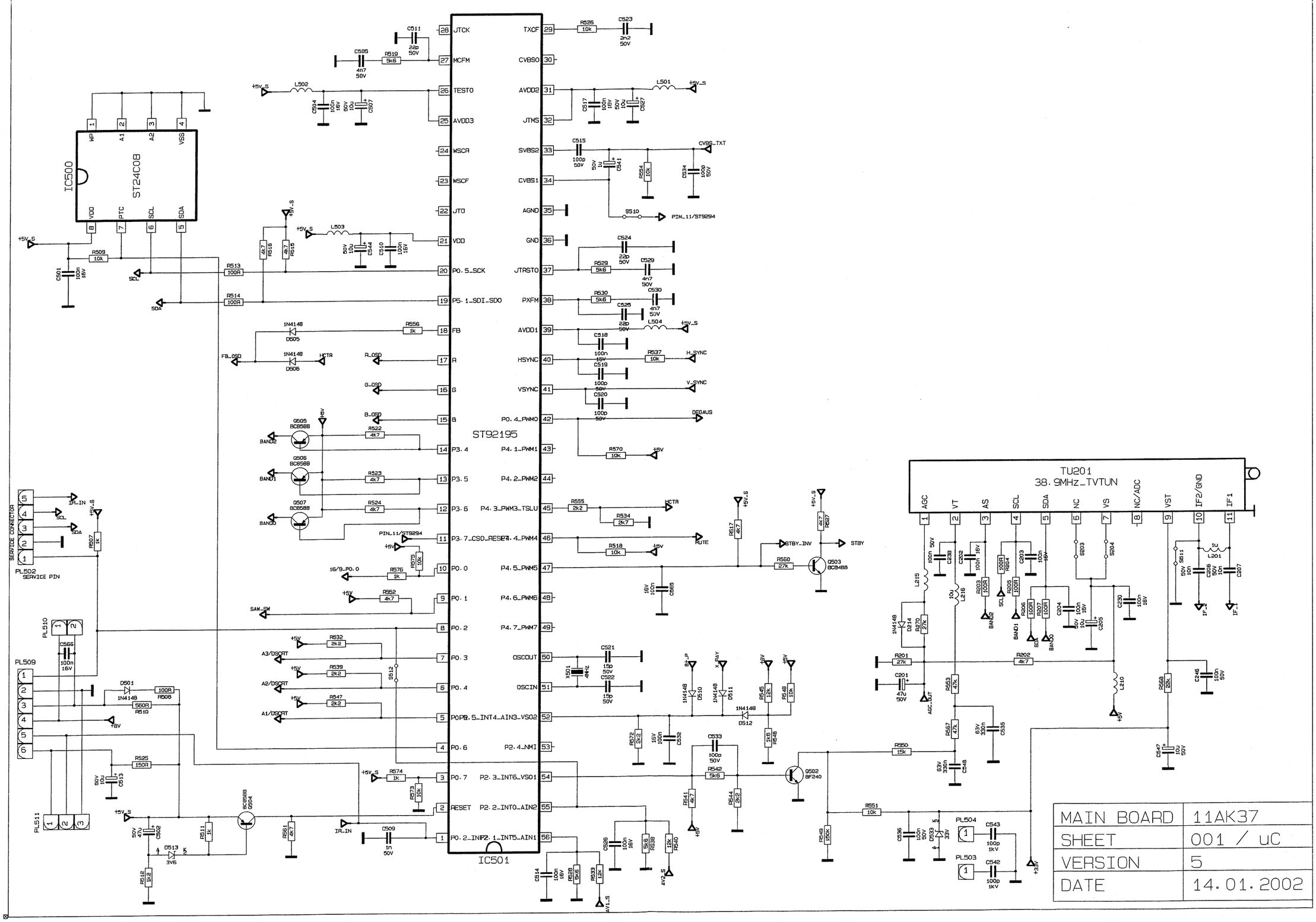
PL303

PL304

PL407

JACK_V2P

JK303


IC500
ST24C08
WP
A1
A2
VSS
VDD
PTC
SCL
SDA
IC501
ST92195
JTCK
MCFM
TESTO
AVDD3
WSCR
WSCF
JTO
VDD
P0.5_SCK
P5.1_SDI_SDO
FB
R
G
B
P3.4
P3.5
P3.6
P3.7_CSO_RESET
P0.0
P0.1
P0.2
P0.3
P0.4
P0.5_INT4_AIN3_VSO2
P0.6
P2.4_NMI
P0.7
P2.3_INT6_VSO1
RESET
P2.2_INT0_AIN2
P0.2_INT2
P2.1_INT5_AIN1
TXCF
CVBSO
AVDD2
JTMS
SVBS2
CVBS1
AGND
GND
JTRSTO
PXFM
AVDD1
HSYNC
VSYNC
P0.4_PWM0
P4.1_PWM1
P4.2_PWM2
P4.3_PWM3_TSLU
P4.4_PWM4
P4.5_PWM5
P4.6_PWM6
P4.7_PWM7
OSCOUT
OSCIN
CVBS_TXT
PIN_11/ST9294
H_SYNC
V_SYNC
DEGAUS
MUTE
STBY_INV
STBY
TU201
38.9MHz_TVTUN
AGC
VT
AS
SCL
SDA
NC
VS
NC/ADC
VST
IF2/GND
IF1
PL502
SERVICE PIN
SERVICE CONNECTOR
PL509
PL510
PL511
PL503
PL504
Q501
BC858B
Q502
BF240
Q503
BC848B
Q504
BC858B
Q505
BC858B
Q506
BC858B
Q507
BC858B
D501
1N4148
D505
1N4148
D506
1N4148
D512
1N4148
D513
3V6
D514
1N4148
D533
33V
D510
1N4148
D511
1N4148
X501
4MHz
S510
S511
S512
S513
S514
S515
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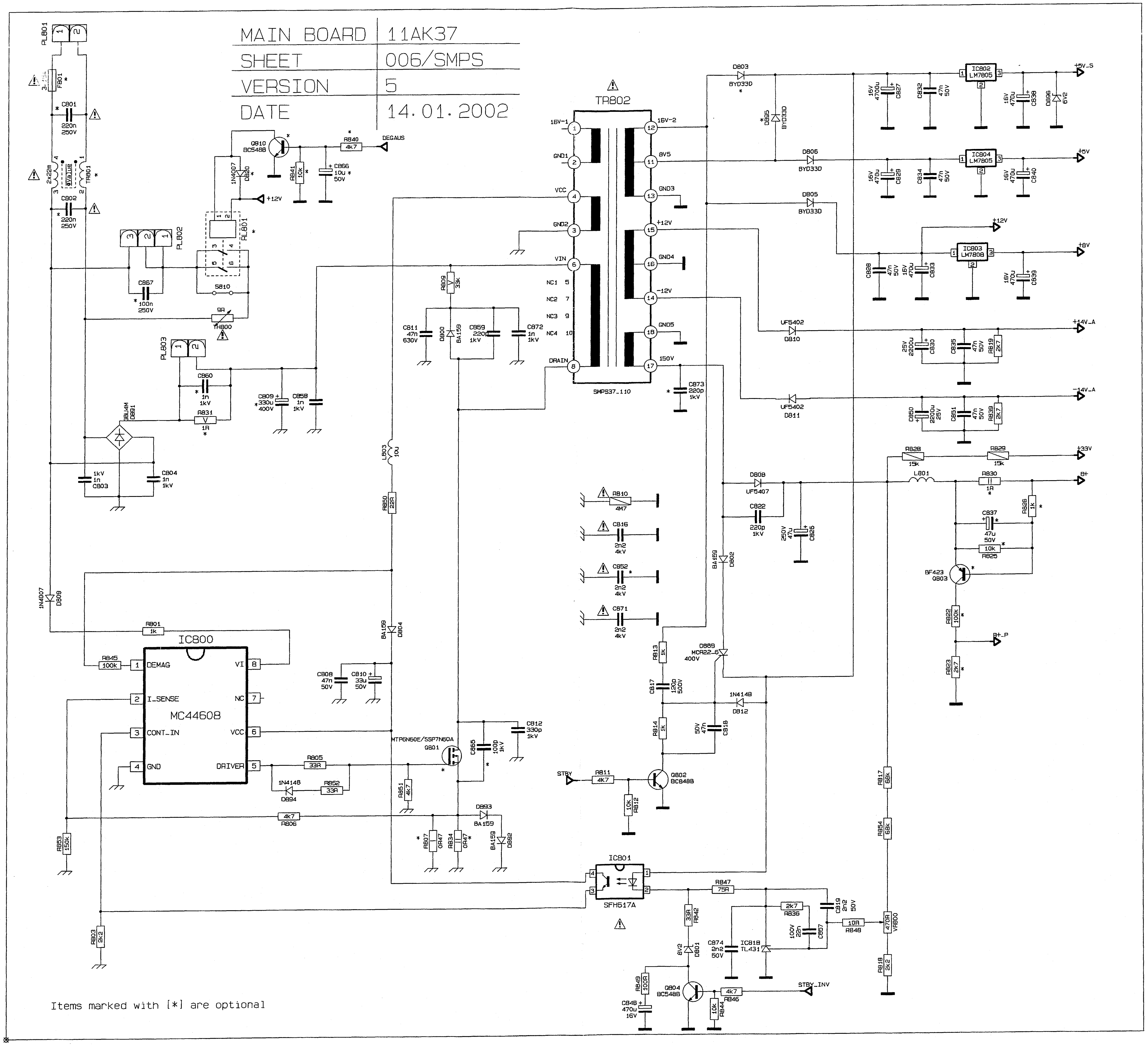
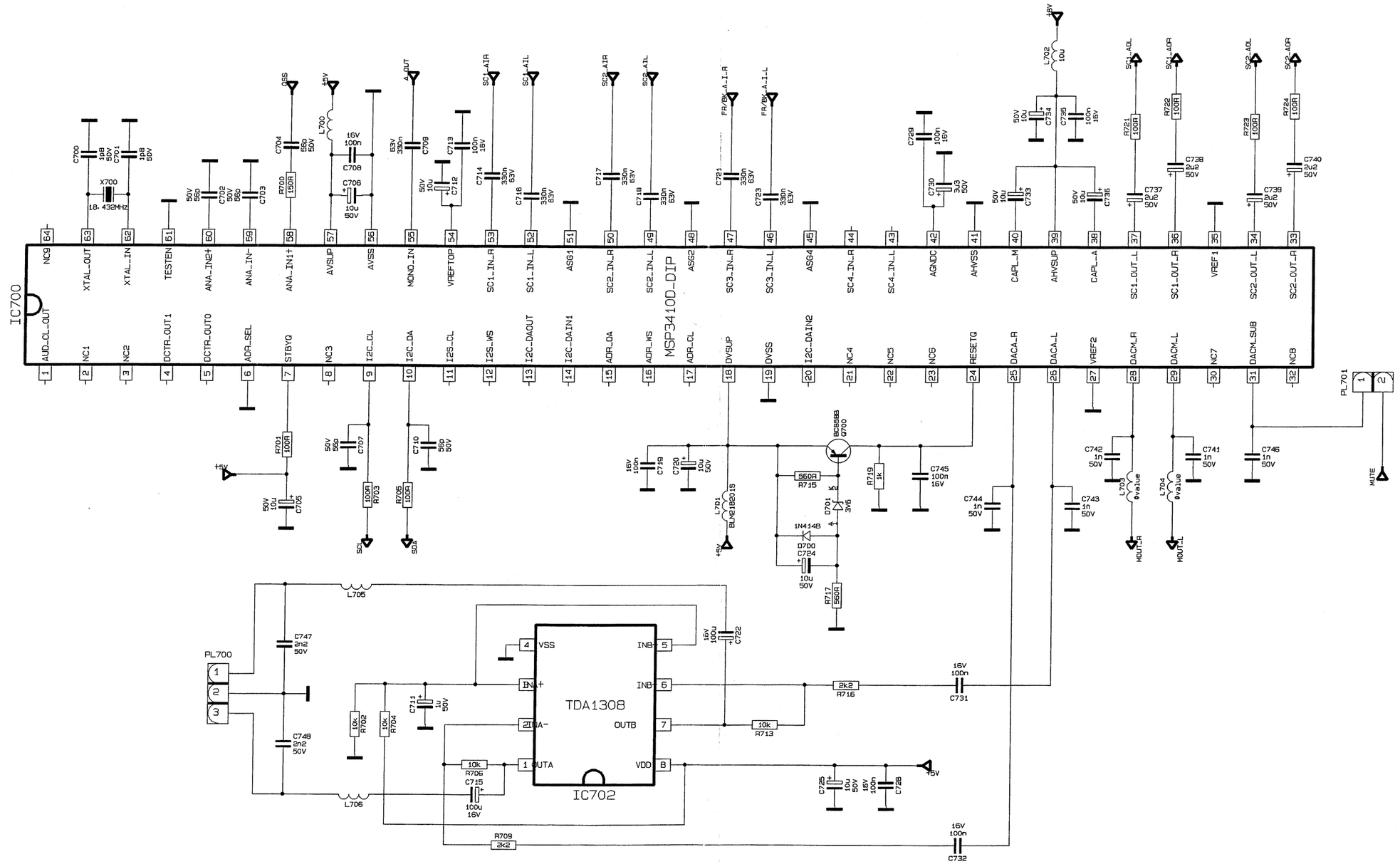


MAIN BOARD 11AK37
SHEET 006/SMPS
VERSION 5
DATE 14.01.2002
TR802
SMPS37_110
IC800
MC44608
DEMAG
I_SENSE
CONT_IN
GND
VI
NC
VCC
DRIVER
IC801
SFH617A
IC802 LM7805
IC804 LM7805
IC803 LM7808
IC818 TL431
Q801 MTP6N60E/SSP7N60A
Q802 BC848B
Q803 BF423
Q804 BC548B
Q810 BC548B
PL801
PL802
PL803
RL801
S810
TH800
TR801
DEGAUS
+12V
+5V_S
+5V
+8V
+14V_A
-14V_A
+33V
B+
B+_P
STBY
STBY_INV

Items marked with [*] are optional

MAIN BOARD	11AK37
SHEET	003/Video
VERSION	5
DATE	24.01.2002

SEG-00233 / DRUCK 5



MAIN BOARD	11AK37
SHEET	007/Stereo
VERSION	5
DATE	14.01.2002